

CLAIMS

The invention claimed is:

- 5 1. A device comprising:
jitter buffer means for receiving from a network packets that encode data which
represent sound; and
decoding means for decoding the packets, the decoding means including a
processor adapted to
10 determine an intended sequence of the voice data from the received packets;
arrange the received packets in the sequence;
infer lost packets in places of the sequence not having a corresponding received
packet; and
determine a burstiness statistic for quantifying how the lost packets are distributed
15 with respect to the received packets within the sequence.
2. The device of claim 1, wherein the processor is further adapted to:
determine a figure of merit for the sequence from the burstiness statistic.
- 20 3. The device of claim 2, wherein the processor is further adapted to:
determine an average packet loss rate,
wherein the figure of merit is determined also from the average packet loss rate.
4. The device of claim 1, wherein the processor is further adapted to the burstiness
25 statistic by:
counting in the sequence at least one duration number of contiguously occurring
of one of lost packets and received packets.
5. The device of claim 4, wherein the processor is further adapted to:
30 determine a figure of merit for the sequence from the burstiness statistic.

6. The device of claim 5, wherein the processor is further adapted to:
determine an average packet loss rate,
wherein the figure of merit is determined also from the average packet loss rate.

5 7. The device of claim 4, wherein the burstiness statistic is
a maximum of a plurality of duration numbers.

8. The device of claim 4, wherein the burstiness statistic is
an average of a plurality of duration numbers.

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9. The device of claim 4, wherein the burstiness statistic is
a variance of a plurality of duration numbers.

10. The device of claim 1, wherein the processor is further adapted to determine the
15 burstiness statistic by:

defining good states in the sequence that correspond to at least some of the
received packets;

defining bad states in the sequence that correspond to at least some of the lost
packets; and

20 counting a number of transitions in the sequence between the good states and the
bad states.

11. The device of claim 10, wherein the processor is further adapted to:
determine a figure of merit for the sequence from the burstiness statistic.

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12. The device of claim 11, wherein the processor is further adapted to:
determine an average packet loss rate,
wherein the figure of merit is determined also from the average packet loss rate.

30 13. The device of claim 10, wherein the processor is further adapted to:
compute a normalized burstiness statistic from the burstiness statistic.

14. The device of claim 13, wherein the processor is further adapted to:
determine a figure of merit for the sequence from the normalized burstiness
statistic.

5 15. The device of claim 14, wherein the processor is further adapted to:
determine an average packet loss rate,
wherein the figure of merit is determined also from the average packet loss rate.

10 16. The device of claim 10, wherein the processor is further adapted to determine the
burstiness statistic by:

count a number of packets; and
divide the counted number of transitions by the counted number of packets.

15 17. The device of claim 16, wherein
the counted transitions are from the bad states to the good states, and
the counted packets are the lost packets.

18. A device comprising:
a network interface for coupling to a network; and
20 a processor coupled with the network interface, wherein the processor is adapted
to
receive packets containing voice data from a network;
determine an intended sequence of the voice data from the received packets;
arrange the received packets in the sequence;
25 infer lost packets in places of the sequence not having a corresponding received
packet; and
determine a burstiness statistic for quantifying how the lost packets are distributed
with respect to the received packets within the sequence.

30 19. The device of claim 18, wherein the processor is further adapted to:
determine a figure of merit for the sequence from the burstiness statistic.

20. The device of claim 19, wherein the processor is further adapted to:
determine an average packet loss rate,
wherein the figure of merit is determined also from the average packet loss rate.

5 21. The device of claim 18, wherein the processor is further adapted to the burstiness
statistic by:

counting in the sequence at least one duration number of contiguously occurring
of one of lost packets and received packets.

10 22. The device of claim 21, wherein the processor is further adapted to:
determine a figure of merit for the sequence from the burstiness statistic.

23. The device of claim 22, wherein the processor is further adapted to:
determine an average packet loss rate,
15 wherein the figure of merit is determined also from the average packet loss rate.

24. The device of claim 21, wherein the burstiness statistic is
a maximum of a plurality of duration numbers.

20 25. The device of claim 21, wherein the burstiness statistic is
an average of a plurality of duration numbers.

26. The device of claim 21, wherein the burstiness statistic is
a variance of a plurality of duration numbers.

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27. The device of claim 18, wherein the processor is further adapted to determine the
burstiness statistic by:

defining good states in the sequence that correspond to at least some of the
received packets;

30 defining bad states in the sequence that correspond to at least some of the lost
packets; and

counting a number of transitions in the sequence between the good states and the bad states.

28. The device of claim 27, wherein the processor is further adapted to:
5 determine a figure of merit for the sequence from the burstiness statistic.

29. The device of claim 28, wherein the processor is further adapted to:
determine an average packet loss rate,
wherein the figure of merit is determined also from the average packet loss rate.

30. The device of claim 27, wherein the processor is further adapted to:
compute a normalized burstiness statistic from the burstiness statistic.

31. The device of claim 30, wherein the processor is further adapted to:
15 determine a figure of merit for the sequence from the normalized burstiness statistic.

32. The device of claim 31, wherein the processor is further adapted to:
determine an average packet loss rate,
20 wherein the figure of merit is determined also from the average packet loss rate.

33. The device of claim 27, wherein the processor is further adapted to determine the burstiness statistic by:

count a number of packets; and

25 divide the counted number of transitions by the counted number of packets.

34. The device of claim 33, wherein
the counted transitions are from the bad states to the good states, and
the counted packets are the lost packets.

35. An article comprising: a storage medium, said storage medium having stored thereon instructions, that, when executed by at least one device, result in:

receiving packets containing voice data from a network;

determining an intended sequence of the voice data from the received packets;

5 arranging the received packets in the sequence;

inferring lost packets in places of the sequence not having a corresponding received packet; and

determining a burstiness statistic for quantifying how the lost packets are distributed with respect to the received packets within the sequence.

10 36. The article of claim 35, wherein the instructions further result in:

determining a figure of merit for the sequence from the burstiness statistic.

37. The article of claim 36, wherein the instructions further result in:

15 determining an average packet loss rate,

wherein the figure of merit is determined also from the average packet loss rate.

38. The article of claim 35, wherein the instructions result in determining the burstiness statistic by:

20 counting in the sequence at least one duration number of contiguously occurring of one of lost packets and received packets.

39. The article of claim 38, wherein the instructions further result in:

determining a figure of merit for the sequence from the burstiness statistic.

25 40. The article of claim 39, wherein the instructions further result in:

determining an average packet loss rate,

wherein the figure of merit is determined also from the average packet loss rate.

30 41. The article of claim 38, wherein the burstiness statistic is a maximum of a plurality of duration numbers.

42. The article of claim 38, wherein the burstiness statistic is an average of a plurality of duration numbers.

43. The article of claim 38, wherein the burstiness statistic is a variance of a plurality of duration numbers.

44. The article of claim 35, wherein the instructions result in determining the burstiness statistic by:

defining good states in the sequence that correspond to at least some of the received packets;

defining bad states in the sequence that correspond to at least some of the lost packets; and

counting a number of transitions in the sequence between the good states and the bad states.

45. The article of claim 44, wherein the instructions further result in: determining a figure of merit for the sequence from the burstiness statistic.

46. The article of claim 45, wherein the instructions further result in: determining an average packet loss rate, wherein the figure of merit is determined also from the average packet loss rate.

47. The article of claim 44, wherein the instructions further result in: computing a normalized burstiness statistic from the burstiness statistic.

48. The article of claim 47, wherein the instructions further result in: determining a figure of merit for the sequence from the normalized burstiness statistic.

49. The article of claim 48, wherein the instructions further result in: determining an average packet loss rate,

wherein the figure of merit is determined also from the average packet loss rate.

50. The article of claim 44, wherein the instructions further result in determining the burstiness statistic by:

5 counting a number of packets; and
dividing the counted number of transitions by the counted number of packets.

51. The article of claim 50, wherein
the counted transitions are from the bad states to the good states, and
10 the counted packets are the lost packets.

52. A method comprising:
receiving packets containing voice data from a network;
determining an intended sequence of the voice data from the received packets;
15 arranging the received packets in the sequence;
inferring lost packets in places of the sequence not having a corresponding
received packet; and
determining a burstiness statistic for quantifying how the lost packets are
distributed with respect to the received packets within the sequence.

53. The method of claim 52, further comprising:
determining a figure of merit for the sequence from the burstiness statistic.

54. The method of claim 53, further comprising:
25 determining an average packet loss rate,
wherein the figure of merit is determined also from the average packet loss rate.

55. The method of claim 52, wherein the burstiness statistic is determined by:
counting in the sequence at least one duration number of contiguously occurring
30 of one of lost packets and received packets.

56. The method of claim 55, further comprising:
determining a figure of merit for the sequence from the burstiness statistic.
57. The method of claim 56, further comprising:
5 determining an average packet loss rate,
wherein the figure of merit is determined also from the average packet loss rate.
58. The method of claim 55, wherein the burstiness statistic is
a maximum of a plurality of duration numbers.
- 10 59. The method of claim 55, wherein the burstiness statistic is
an average of a plurality of duration numbers.
60. The method of claim 55, wherein the burstiness statistic is
15 a variance of a plurality of duration numbers.
61. The method of claim 52, wherein the burstiness statistic is determined by:
defining good states in the sequence that correspond to at least some of the
received packets;
20 defining bad states in the sequence that correspond to at least some of the lost
packets; and
counting a number of transitions in the sequence between the good states and the
bad states.
- 25 62. The method of claim 61, further comprising:
determining a figure of merit for the sequence from the burstiness statistic.
63. The method of claim 62, further comprising:
determining an average packet loss rate,
30 wherein the figure of merit is determined also from the average packet loss rate.

64. The method of claim 61, further comprising:
computing a normalized burstiness statistic from the burstiness statistic.

65. The method of claim 64, further comprising:
5 determining a figure of merit for the sequence from the normalized burstiness
statistic.

66. The method of claim 65, further comprising:
determining an average packet loss rate,
10 wherein the figure of merit is determined also from the average packet loss rate.

67. The method of claim 61, wherein the burstiness statistic is further determined by:
counting a number of packets; and
dividing the counted number of transitions by the counted number of packets.

68. The method of claim 67, wherein
the counted transitions are from the bad states to the good states, and
the counted packets are the lost packets.